



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,106	11/14/2003	Jiutao Li	M4065.0706/P706	8216
45374	7590	09/25/2007		
DICKSTEIN SHAPIRO LLP 1825 EYE STREET, NW WASHINGTON, DC 20006			EXAMINER MCDONALD, RODNEY GLENN	
			ART UNIT 1753	PAPER NUMBER
			MAIL DATE 09/25/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/712,106	LI ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-86 is/are pending in the application.
- 4a) Of the above claim(s) 85 and 86 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-84 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claims 85 and 86 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on July 23, 2007.

Claim Rejections - 35 USC § 112

Claims 22 and 82 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 82 is indefinite because the claim should end in a period.

Claim 22, line 2, is indefinite because "the sputter target racetrack area" lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1753

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 1, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63)

Regarding claim 2, Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56)

Regarding claim 4, Case et al. teach the power density can be "less than about" 1 W/cm². (Column 7 lines 56-58; i.e. 1.1 W/cm² is interpreted to read on "less than about" 1 W/cm².)

Regarding claim 5, Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 6, Case et al. teach the target can be kept at a temperature less than 350 degrees C. (Column 7 lines 54-56)

Regarding claim 7, Case et al. teach maintaining the target at less than 350 degrees C and utilizing a sputter gas having a molecular weight greater than neon. (Column 7 lines 54-56; Column 7 lines 25-32; Column 8 lines 32)

Regarding claim 9, Case et al. teach maintaining the target below 350 degrees C by utilizing a cooling apparatus. (Column 6 lines 28-30)

Regarding claim 12, Case et al. teach that the sputtering can be performed in AN RF field. (Column 10 lines 42)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 1), utilizing a sputter power less than 200 W is not discussed (Claim 3) and utilizing a pressure less than 10 mTorr is not discussed (Claim 6).

Regarding the semiconductor material being silver selenide (Claim 1), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Art Unit: 1753

Regarding claim 3, Ovshinsky et al. teach utilizing a sputter power of 40-60 watts for depositing the semiconductor material. (See Table 2)

Regarding claim 6, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 1-7, 9 and 12 above, and further in view of Boys et al. (U.S. Pat. 4,500,408).

The difference not yet discussed is the position of the magnetron to control temperature. (Claim 8).

Regarding claim 8, Boys et al. teach positioning a magnetron to control the temperature. (Column 5 lines 34-45)

The motivation for positioning a controllable magnetron is that it allows control of temperature of the target. (Column 5 lines 34-45)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Boys et al. because it allows for control of temperature of the target.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 1-7, 9 and 12 above, and further in view of Sellers (U.S. Pat.5,810,982).

The difference not yet discussed is using DC or pulsed Dc for the sputtering process. (Claims 10 and 11)

Regarding claims 10 and 11, Sellers teach applying pulses of a positive voltage onto negative dc sputtering current that is applied to the target of a dc sputtering process to create a reverse bias. This charges insulating deposits on the target to the reverse bias level, so that when negative sputtering voltage is reapplied to the target, the deposits will be preferentially sputtered away. The reverse bias pulses are provided at a low duty cycle, i.e., with a pulse width of 0.25 to 3 microseconds at a pulse range of 40 to 200 KHz. (See Abstract) Sellers further teach that the pulse DC sputter deposition process eliminates dielectric materials and other impurities on the target. (Column 4 lines 55-58)

The motivation for utilizing a pulse DC sputter deposition process, a particular frequency of the pulse DC sputter deposition process and the pulse width range of the pulse DC sputter deposition process is that it will allow for reduction or elimination of sources for arcing. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized DC and pulsed DC sputtering as taught by Sellers because it eliminates arcing.

Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 13, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63)

Regarding claim 14, Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56)

The difference between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 13), utilizing a sputter power less than 200 W is not discussed (Claim 15) and utilizing a power of less than 100 W is not discussed (Claim 16).

Regarding the semiconductor material being silver selenide (Claim 13), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be

Art Unit: 1753

layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding claims 15, 16, Ovshinsky et al. teach utilizing a sputter power of 40-60 watts for depositing the semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky et al. is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 17-19, 20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claims 17, 18, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach the power density can be "less than about" 1 W/cm^2 . (Column 7 lines 56-58; i.e. 1.1 W/cm^2 is

Art Unit: 1753

interpreted to read on "less than about" 1 W/cm^2 .) Case et al. teach that the target is temperature is maintained at less than 350 degrees C during the sputtering process.

(Column 7 lines 54-56)

Regarding claim 19, Case et al. teach the target can be kept at a temperature less than 250 degrees C. (Column 7 lines 54-56)

The difference between Case et al. and the present claims is that that the semiconductor material be silver selenide is not discussed (Claim 17) and how the power density is measured (Claims 20, 24)

Regarding the semiconductor material being silver selenide (Claim 17), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Regarding claims 20 and 24, since Case et al. teach the power density to be power divided by area which suggest applicant's measurement.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 21, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 17-19, 20, 23 and 24 above, and further in view of Boys et al. (U.S. Pat. 4,500,408).

The differences not yet discussed is the non-uniform erosion (Claim 21) and the race track profile (Claim 22)

Regarding claims 21, 22, Boys et al. teach utilizing a magnetron to produce a racetrack profile. (See Figs. 1, 2)

The motivation for utilizing the features of Boys et al. is that it allows for depositing films. (Column 1 lines 9-12)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Boys et al. because it allows for depositing films.

Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding Claims 25, 26, 27, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a

Art Unit: 1753

sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56) Case et al. teach the target can be kept at a temperature less than 250 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

The difference between Case et al. and the present claims is that that the semiconductor material be silver selenide is not discussed (Claim 25).

Regarding the semiconductor material being silver selenide (Claim 25), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Art Unit: 1753

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claims 28, 29, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 30, Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 28) and utilizing a pressure less than 10 mTorr is not discussed (Claim 28).

Art Unit: 1753

Regarding the semiconductor material being silver selenide (Claim 28), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding claim 28, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 31, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter

Art Unit: 1753

deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach maintaining the target at less than 350 degrees C and utilizing a sputter gas having a molecular weight greater than neon. (Column 7 lines 54-56; Column 7 lines 25-32; Column 8 lines 32)

Regarding claim 32, Case et al. teach utilizing argon as the sputtering gas. (Column 8 line 32)

Regarding claim 33, Case et al. teach that the gas can be an inert gas which include xenon. (Column 7 lines 25-32)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 31).

Regarding the semiconductor material being silver selenide (Claim 31), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition.

Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 34, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach maintaining the target below 350 degrees C by utilizing a cooling apparatus. (Column 6 lines 28-30)

Regarding claim 35, Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56)

Regarding claim 36, Case et al. teach a target backing plate attached to and in thermodynamic contact with the semiconductor target. (Column 10 lines 64-68; Fig. 2)

Regarding claim 37, Case et al. teach the sputtering target has a cooling jacket in the form of water jacket. (Column 10 lines 64-68)

Regarding claim 38, Case et al. teach that the cooling chamber allows a cooling fluid to flow across the target backing plate. (Column 10 lines 64-68; Fig. 2)

Regarding claim 39, the cooling flow is set by the operator and desired temperature. (Column 10 lines 64-68)

Regarding claim 40, since the target can be cooled to a temperature less than 50 degrees C the cooling fluid must be also at a temperature less than 50 degrees C. Such range encompasses applicant's claims. (Column 7 lines 54-56; Column 10 lines 64-68; Fig. 2)

Regarding claim 41, Case et al. show in Fig. 2 that the thermal conductivity is maximized. (See Fig. 2)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 34).

Regarding the semiconductor material being silver selenide (Claim 34), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element

Art Unit: 1753

(i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 34-40 above, and further in view of Hollars et al. (U.S. Pat. 5,753,092).

The difference not yet discussed is the color black. (Claim 42)

Regarding claim 42, Hollars et al. teach utilizing black paint on elements to facilitate heat removal. (Column 10 lines 45-56)

The motivation for utilizing the color black is that it facilitates heat removal. (Column 10 lines 45-56)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the feature of Hollars et al. because it allows for assisting in heat removal.

Art Unit: 1753

Claims 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 43, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) In Fig. 2 Case et al. show the appropriate spacing between the target and the substrate. (See Fig. 2)

Regarding claim 44, Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56)

The difference between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 43).

Regarding the semiconductor material being silver selenide (Claim 43), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition.

Art Unit: 1753

Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 45, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas (Argon) into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 46, Case et al. teach the sputter gas can be argon. (Column 7 lines 54-56; Column 7 lines 25-32; Column 8 lines 32)

Regarding claim 47, Case et al. suggest the gas can be an inert gas which encompasses xenon. (Column 7 lines 25-32)

Regarding claim 48, Case et al. teach the target can be kept at a temperature less than 350 degrees C. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 49, Case et al. teach maintaining the target below 350 degrees C by utilizing a cooling apparatus. (Column 6 lines 28-30)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 45) and utilizing a pressure less than 10 mTorr is not discussed (Claim 45).

Regarding the semiconductor material being silver selenide (Claim 45), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding claim 45, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claims 50-57 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claims 50, 51, since Case et al. in combination with Ovshinsky et al. teach producing films at applicant's conditions then the film produced is considered to be defect free. (See Case et al. and Ovshinsky et al. discussed above)

Regarding claim 50, 51, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63)

Regarding claim 52, Case et al. teach that the target is temperature is maintained at less than 350 degrees C during the sputtering process. (Column 7 lines 54-56)

Regarding claims 53, 54, Case et al. teach that the target temperature is maintained at less than 350 degrees C during the sputtering while the power density

Art Unit: 1753

can be "less than about" 1 W/cm^2 . (Column 7 lines 56-58; i.e. 1.1 W/cm^2 is interpreted to read on "less than about" 1 W/cm^2 .)

Regarding claim 55, Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 57, Case et al. teach maintaining the target at less than 350 degrees C and utilizing a sputter gas having a molecular weight greater than neon. (Column 7 lines 54-56; Column 7 lines 25-32; Column 8 lines 32)

Regarding claim 59, Case et al. teach maintaining the target below 350 degrees C by utilizing a cooling apparatus. (Column 6 lines 28-30)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claims 50, 51) and utilizing a pressure less than 10 mTorr is not discussed (Claim 56).

Regarding the semiconductor material being silver selenide (Claims 50, 51), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present

Art Unit: 1753

in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding claim 56, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 50-57 and 59 above, and further in view of Boys et al. (U.S. Pat. 4,500,508).

The difference not yet discussed is positioning the magnetron to control temperature. (Claim 58)

Regarding claim 58, Boys et al. teach positioning a magnetron to control the temperature. (Column 5 lines 34-45)

The motivation for positioning a controllable magnetron is that it allows control of temperature of the target. (Column 5 lines 34-45)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Boys et al. because it allows for control of temperature of the target.

Art Unit: 1753

Claims 60-67 and 72-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claim 60, Case et al. teach forming a semiconductor material on a substrate including providing an apparatus having a chamber and vacuum enclosure include a target made of semiconductor material. Maintaining the semiconductor target at a temperature of less than about 350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63)

Regarding claim 61, Case et al. teach maintaining the target below 350 degrees C by utilizing a cooling apparatus. (Column 6 lines 28-30)

Regarding claim 62, Case et al. teach a target backing plate attached to and in thermodynamic contact with the semiconductor target. (Column 10 lines 64-68; Fig. 2)

Regarding claim 63, Case et al. teach the sputtering target has a cooling chamber in the form of water jacket. (Column 10 lines 64-68)

Regarding claim 64, Case et al. teach that the cooling chamber allows a cooling fluid to flow across the target backing plate. (Column 10 lines 64-68; Fig. 2)

Regarding claim 65, the cooling flow is set by the operator and desired temperature. (Column 10 lines 64-68)

Regarding claim 66, since the target can be cooled to a temperature less than 50 degrees C the cooling fluid must be also at a temperature less than 50 degrees C.

Art Unit: 1753

Such range encompasses applicant's claims. (Column 7 lines 54-56; Column 10 lines 64-68; Fig. 2)

Regarding claim 67, Case et al. show in Fig. 2 that the thermal conductivity is maximized. (See Fig. 2)

Regarding claim 72, Case et al. teach the target can be kept at a temperature less than 350 degrees C and pressure less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claim 73, Case et al. teach maintaining the target at less than 350 degrees C and utilizing a sputter gas having a molecular weight greater than neon. (Column 7 lines 54-56; Column 7 lines 25-32; Column 8 lines 32)

Regarding claim 74, Case et al. teach the sputter deposition gas can be argon. (Column 8 lines 32).

Regarding claim 75, Case et al. teach the sputter deposition gas to be an inert gas. Inert gas encompasses xenon. (Column 7 lines 25-32)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claim 60) and maintaining the pressure less than 10 mT (Claim 76).

Regarding the semiconductor material being silver selenide (Claim 60), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least

Art Unit: 1753

one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding claim 76, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 60-67 and 72-76 above, and further in view of Hollars et al. (U.S. Pat. 5,753,092).

Regarding claim 68, Hollars et al. teach utilizing black paint on elements to facilitate heat removal. (Column 10 lines 45-56)

The motivation for utilizing the color black is that it facilitates heat removal. (Column 10 lines 45-56)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the feature of Hollars et al. because it allows for assisting in heat removal.

Claims 69-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. in view of Ovshinsky et al. as applied to claims 60-67 and 72-76 above, and further in view of Boys et al. (U.S. Pat. 4,500,408).

The differences not yet discussed is the use of a magnetron (Claim 69) and the magnetron controlling the temperature (Claims 70, 71).

Regarding claims 69, 70, 71, Boys et al. teach positioning a magnetron to control the temperature. (Column 5 lines 34-45)

The motivation for positioning a controllable magnetron is that it allows control of temperature of the target. (Column 5 lines 34-45)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Boys et al. because it allows for control of temperature of the target.

Claims 77-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. (U.S. Pat. 4,818,357) in view of Ovshinsky et al. (U.S. Pat. 5,534,711).

Regarding claims 77, 81, Case et al. teach forming a semiconductor material on a substrate including providing a target made of semiconductor material in a sputter deposition chamber. Introducing a sputter gas into the chamber. Conducting a sputtering process on the target to produce a deposited semiconductor film on the substrate. Maintaining the semiconductor target at a temperature of less than about

Art Unit: 1753

350 degrees during the sputtering process. The semiconductor can be binary. (Column 7 lines 25-32; Column 7 lines 54-56; Column 8 lines 52-63) Case et al. teach that the target is temperature is maintained at less than 250 degrees C during the sputtering process. (Column 7 lines 54-56) Case et al. teach the power density can be "less than about" 1 W/cm^2 . (Column 7 lines 56-58; i.e. 1.1 W/cm^2 is interpreted to read on "less than about" 1 W/cm^2 .) Case et al. teach the target can be kept at a temperature less than 350 degrees C and less than 40 mTorr. (Column 7 lines 44-51; Column 7 lines 54-56)

Regarding claims, 78, 79, 82, 83, Case et al. teach maintaining the substrate at a high temperature above 30 degrees C. (Column 7 lines 52-54)

The differences between Case et al. and the present claims is that the semiconductor material be silver selenide is not discussed (Claims 77, 81), forming alpha phase and beta phase silver selenide is not discussed (Claims 77, 81) utilizing a sputter power less than 250 W is not discussed (Claims 80, 84) and utilizing a pressure less than 10 mTorr is not discussed (Claims 80, 84).

Regarding the semiconductor material being silver selenide (Claims 77, 81), Ovshinsky et al. teach Ovshinsky et al. teach a method of forming a memory device from semiconductor material. The memory device have a large dynamic range of electrical resistance values. (See Abstract; Column 1 lines 19-33) The memory material of the device is formed from a plurality of atomic constituent elements including at least one chalcogen element (i.e. Se) and may include at least one transition metal element (i.e. Ag). (Column 14 lines 64-68; Column 15 lines 1-12) The memory material can be

Art Unit: 1753

layered by forming a plurality of discrete, relatively thin layers of different composition. Any number of layers can be used and multiple layers of the same alloy may be present in the volume of memory material. (Column 19 lines 20-38) The layer of memory material can be deposited by sputtering. (Column 20 lines 56-60)

Regarding forming alpha phase and beta phase silver selenide (Claims 77, 81), since the combination of Case et al. with Ovshinsky et al. suggest Applicant process conditions and silver selenide then deposition of alpha and beta phases will be taking place. (See Case et al. and Ovshinsky et al. discussed above)

Regarding claims 80, 84, Ovshinsky et al. teach utilizing a sputter power of 40-60 watts for depositing the semiconductor material. (See Table 2)

Regarding claims 80, 84, Ovshinsky et al. teach utilizing a pressure 4-8 mT for sputtering semiconductor material. (See Table 2)

The motivation for utilizing the features of Ovshinsky is that it allows for making a semiconductor memory element. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Case et al. by utilizing the features of Ovshinsky et al. because it allows for making a semiconductor memory element.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

Art Unit: 1753

F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-84 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 4, 6, 7, 9-20, 36-38, 40-48, 50-60, 76 and 77 of copending Application No. 10/230,279 in view of Case et al. (U.S. Pat. 4,818,357).

Claims of copending Application No. 10/230,279 suggest the limitations of the present application except for the control of the temperature of the target.

Case et al. teach controlling the temperature of the target for depositing binary semiconductor material. (See Case et al. discussed above)

The motivation for utilizing the features of Case et al. is that it allows for preventing the material from evaporating.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified 10/230,279 by providing cooling as taught by Case et al. because it prevents evaporation of the target material during sputtering.


Art Unit: 1753

This is a provisional obviousness-type double patenting rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-TH with every Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
September 18, 2007